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ABSTRACT

This paper discusses the term "biofeedback" in its historical context and relates it to behavioral research in speech communication. The paper presents an operational model of the communication process, suggesting that biofeedback techniques might be used within the scope of the model to monitor, study, and ultimately modify an individual's normal or dysfunctional speech behaviors. A glossary and a list of references pertinent to the biofeedback area are provided. (BL)

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BIOFEEDBACK AND COMMUNICATION: PERSPECTIVES
AND DEFINITIONS**

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I. Introduction

"Biofeedback," a term coined several years ago has become a subject of considerable fascination both to the general public and scientific community. What is it? What are its origins? How might it apply to research in human communicative behavior? Is it the faddish snake oil of modern medicine men, a technique of mystical revelation and self-control based on religious philosophies of the Far East, technological application of standard scientific principles of learning, or some combination of these?

Hailed as "the greatest single development in the history of psychology" and as "the newest, most exciting, and potentially farthest-reaching discovery ever to emerge from biomedical research" (Brown, 1977), biofeedback has not become the cure-all due to impossible expectations that have been raised (Melzack, 1975; Time, 1975). However, biofeedback techniques have received extensive coverage from virtually every major news medium.

Various universities and national governments have spent millions of dollars to finance research in biofeedback leading to reports of preliminary controls (cures) for a multitude of problems such as: anxiety, asthma, diabetes, epilepsy, insomnia, hyperactivity, hypertension, torticollis, phobias, stress, peptic ulcers, chronic pain, rheumatoid arthritis, muscle rehabilitation, tension and migraine headaches. With such an impressive list of medical and psychological references, perhaps conspicuous by its absence

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is any direct reference to either normal or dysfunctional communicative behaviors.

The purpose of this panel session is to orient and inform our listeners about the emerging era of biofeedback research. Some theoretical and pioneering research implications will be discussed along with possible applications across the broad spectrum of human communicational behavior.

The purpose of the present paper is to define and set in perspective the terms biofeedback and communication by identifying in broad strokes the historical forebears of the former term, and to provide in the printed copy of this paper a selected glossary of terms and a bibliography of references pertinent to inquiry in the biofeedback area.

II. Historical Background

For over 3,000 years the religious philosophies of the Hindu-Yogi and the Zen-Buddhists have claimed self-control over bodily functions. These Yogi and Zen masters have used various physical, psychological, spiritual and meditative methods to achieve their control (Bagchi and Wenger, 1957, Bagchi, 1969, Lesh, 1971). A modern version of yoga has emerged under the label of transcendental meditation - (TM), (Mahesh Yogi, 1969).

In the European countries, a different technique from Eastern mysticism was developed. Known as hypnotism, the method began in the 18th century and has continued until today (Waite, 1960). Sometimes referred to as "animal magnetism," hypnotism allows a person while in a trance-like state, to exercise control of bodily functions while under the influence of a hypnotist. A variation of the technique called auto-hypnosis or self-suggestion, produces a self-induced trance state to achieve the self-control (Schultz & Luthe, 1969).

In The United States, research at universities such as Harvard, Yale, Rockefeller, and Ohio has helped to pioneer still another method of self-control.

This method was developed by combining electronic technology and B. F. Skinner's Operant Conditioning principles first to animal studies and eventually to man (Budzynski & Stoyva, 1969; Miller, 1969; DiCara, 1970). Thus, the biofeedback technology and research resulted. It is a process which combines Far Eastern mysticism and Western technology, but without the influence of meditation, drugs, hypnotists or therapists. Specifically, it is a process that uses electrophysiological instrumentation to help a person learn self-control over specific bodily functions such as heart rate, blood pressure, muscle tension and others that were once thought to be involuntary. With the aid of electronic equipment, an individual can learn self-control by receiving continuous and instantaneous information about the body's biological functioning. Small electrodes (approximately a half inch in size) are taped to the body surface of the subject. The electrodes sense the amount of electrical activity of the desired bodily functions. This data is transmitted through wires to the monitor where it is displayed as a form of auditory and/or visual output.

III. Implications for Studying Communicative Behavior

Monitoring of the physiological processes of the body during the communicative event is not uncommon. In 1959, Clevenger reported on the state of the art concerning research in stage fright, including the measurement of sweat gland activity during stage fright. Stern and Lewis (1967) reported that actors could learn to control emotional expression with the use of the Galvanic Skin Response (GSR). Kohan (1968) suggested that the communicative effectiveness of advertising could be physiologically measured. Heart rate has been used as an index to stage fright and communicative apprehension (Behnke & Carlile, 1971; Porter, 1974). Fletcher (1973) implied that the GSR could add a new approach to the analysis of public communication. Gibb, Stephan and

Rohm (1975) suggested that muscle activity effected the performance of communicative ability. Emmert and Brook (1970) and Barker and Kibler (1971) included chapters in their anthologies concerning the monitoring of the physiological activity of the body. Although these references are not exhaustive, they do suggest that researchers in human communication have monitored bodily processes. However, these monitoring processes were not used to give continuous feedback to the communicators themselves, as in biofeedback techniques.

If one defines communication operationally as the sharing of experiences as evidenced by response behaviors, a minimum of five sequential ingredients are involved: (1) a generator of a (2) stimulus which is (3) projected to a (4) perceiver who (5) responds discriminately (assigns meaning). The basic units in the communicative process therefore can be represented simplistically by the model $G \xrightarrow{S} P^R$, where G represents the generator, S represents a stimulus, P represents a perceiver, R represents a differential response, and $\rightarrow$ represents projection in time (Goyer, 1970). In the use of this model, biofeedback techniques might be used to modify both normal and dysfunctional behaviors of the participants as they interact, as well as monitoring and ultimately controlling individual stress during intrapersonal data processing. Communicationologists have only recently begun to explore these phenomena using biofeedback techniques (Rohm, 1977). The research opportunities are manifold; more workers in the field are needed!

GLOSSARY

Afferent System: the system used for the transmission of neural impulses toward the central nervous system from sensory nerves that are projected in every portion of the body.

Altered States of Consciousness (ASC): a term associated with trances, hypnotism, dreams, ecstasy, and psychedelic experiences.

Anxiety: a physiological condition in which various bodily functions increase their activity (increase heart rate, muscle tension, breathing, glandular secretion, etc.) resulting from a psychological state of fearsome threat.

Auditory Feedback: the automatic presentation of a tone or an analog or digital basis signaling the degree of performance or non-performance of a behavior.

Autonomic Nervous System (ANS): a system that regulates the visceral functions of the body through the combined aspects of the central and peripheral nervous systems. It is usually divided into the sympathetic and parasympathetic divisions.

Biofeedback: a process that uses electrophysiological instrumentation to signal subjects learning to control voluntarily various bodily functions. The individual typically receives immediate information about the desired bodily processes until perceptual control is attained.

Biofeedback Society of America: an organization founded in 1968 which provides a forum for the exchange of ideas, methods and results of biofeedback and related studies. Its emphasis is primarily on scientific investigation of human behavior and human potential, both in basic and clinical settings.

Brainwaves: spontaneous fluctuations in the electrical activity of the brain.

The rhythmic fluctuations are named according to their frequency: alpha waves (between eight and thirteen HZ), delta waves (less than four HZ), and theta waves (between four and seven HZ).

Central Nervous System (CNS): a system composed of the brain and the spinal cord. The CNS serves two functions: (1) it interconnects the sensory receptors (afferent or input pathways) and the motor effectors (efferent or output pathways), and (2) it permits integration of the various sensory inputs and resulting motor efferents (Grossman, 1967).

Efferent System: the system used for the transmission of neural impulses from the central nervous system to the muscles and glands (peripheral effectors).

Electrocardiograph (EKG): an instrument for recording the potential of the electrical currents that traverse the heart and initiate its contraction (Stedman, 1972).

Nervous System: all the organs of the body that are composed of nerve tissues; the combination of the Central Nervous System and the Peripheral Nervous System.

Peripheral Nervous System (PNS): the system composed of the nerves, ganglia and end organs which connect the Central Nervous System with all the other parts of the body. It translates changes in the physical energy in the internal or external environment into neural impulses which can be used by the CNS to produce overt response to the environment (Grossman, 1967).

Placebo Effect: a measurable change in a subject's physiological functioning induced as a result of the subject's psychological expectations, rather than the alteration of physical variables.

Psychogalvanometer: a device for measuring electrodermal response; a "lie detector".

Psychophysiology: a branch of psychology concerned with research in which the dependent variables is a physiological measure and the independent variable is a "behavioral" one. "Physiological psychology" deals with the manipulation of physiological variables and the recording of behavioral events which "psychophysiology" deals with the manipulation of behavioral events and the recording of physiological variables (Stern, 1964).

Visceral: pertaining to any organ or activity inside the body wall regulated by the sympathetic and parasympathetic portions of the Autonomic Nervous System.

Visual Feedback: the automatic presentation of a light on an analog or digital basis signaling the degree of performance or non-performance of a behavior.

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